

NISTTech

Chain Code Position Detector

Accurate, repeatable measurements for computerized motion control applications

Description

Detect instant element position while monitoring relational element movement such as a computerized rod and cylinder. This method measures the position of a cylinder rod by observing a scale having sequences of coded marks on it. The scales may be inexpensively applied to the cylinder rod through such techniques as photo engraving or laser marking. The sequences of coded marks are detected with a simple electronic camera that takes multiple readings of the sequence so that the resultant information is resistant to sporadic errors. The cylinder rod acts as a rigid base for scales and is thus resistant to mechanical vibration. From a manufacturing standpoint, the detectors are structured to be replicated on a consistent basis to enhance system reliability.

Computerized motion control of actuated cylinders requires rod position and velocity measurements. These measurements must be accurate, repeatable and have sufficient resolution for the particular application. Many applications also require the measurement to be cost effective, easily redundant, immune to mechanical noise and insensitive to debris.

Applications

- **Computer controlled positioning devices**
Virtually any positioning device can benefit from this invention such as hydraulic cylinders, drawbridges, canal locks, gantry cranes, tower cranes, elevators, conveyors, robotics or computer controlled painters
- **Automotive**
High speed applications would include automobile shock absorbers to provide the position and velocity necessary to monitor road and handling conditions and to allow automatic compensation
- **Aerial platforms**
Aerial work platforms, articulated booms and the many different applications where position or time based derivatives or other position related parameters need to be monitored or sensed

Advantages

- **Readable in real-time industrial environments**
Provides instant position detection and redundancy while compensating for dirt and dust deposits. Low maintenance and tolerant of vibrations
- **Cost-saving**
Spacing can be larger allowing for greater detector coverage and lower manufacturing costs than the current absolute position detectors. Minimizes the number of bits that must be observed to determine a unique position
- **Versatile**
The scales can be etched on anodized aluminum to be rugged and very flexible. Any detector or sensor may be used to read the scale

Abstract

A position detector for sensing the position of a movable member which moves along an axis relative to a stationary member. A nonrepeating N bit chain code embodied in a scale on the movable member runs along the axis. A detector fixed to the stationary member is positioned to sense a portion of the chain code. The detector has K elements ($K \gg N$) generating a plurality of signals. A controller determines the position of the movable member relative to the stationary member as a function of the signals.

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References

- U.S. Patent # 6,327,791
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Status of Availability

This invention is available for licensing.

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